## REMARKS

The applicant has obtained the services of a patent attorney as suggested.

A Power of Attorney is enclosed.

A view of the specification indicates that, although long, it is readily amenable to arrangement close to the preferred arrangement. A separate section of "Objects and Advantages" was in the original specification and has been retained because it is believed to be helpful in understanding the invention. A number of minor corrections have been made to the specification, mostly to add articles.

A copy of the latest Abstract has been included. It is understood that this Abstract has been sent to the U.S. Patent and Trademark Office

Claims 1-5 were rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph. These claims have been cancelled and replaced with new claims 6-9, which are similar to original claims 2-5 but rewritten as process claims.

It is believed that a proper way to claim applicant's invention is as a process for designing concrete pavement of a preset strength safety level. The invention concerns more complete utilization of normal, ordinary concrete as generally used in the construction of airport runways, taxiways, aprons, etc., and is not special, or a special mix.

The sense of the present invention is a more complete utilization of flexural strength of concrete considered as a random value for thickness design of concrete

pavement than that provided by the Portland Cement Association design procedure. Strength of any structural material should be considered as a random value. Consumption of material of this structural member is determined by the value of design strength of this material directly or indirectly. The degree of utilization of strength of this material in the process of design of any structural member is determined by the safety of design strength of this material. Thus, the optimal use of any structural material requires

a, The results of research of statistical characteristics of strength of this material.

b. The choice of safety of design strength of material, depending on the requirements of strength safety of structural members designed with the use of this material.

It completely relates to flexural strength of concrete as applied to thickness design of concrete pavement.

Statistical characteristics of flexural strength of concrete were obtained by processing data of 3,650 series of American test results of compressive and flexural strength of standard cylinders and beams and 1,107 series of American and a small portion of British test results of compressive and flexural strength of modified cubes and standard beams of normal concrete. These test results were used for the analysis of connections between the compressive and flexural strength of concrete; and these connections can be considered statistically significant. It allows estimation of the mean

value of flexural strength of concrete depending on the mean value of compressive strength of this concrete.

According to the Portland Cement Association Engineering Bulletin EB109, the modulus of rupture of concrete (MR) as a main characteristic of flexural strength is estimated as a mean value of 28-day flexural strength of this concrete. As applied to airport construction, a 90-day flexural strength is used for thickness design of airport concrete pavement. According to Portland Cement Association Engineering Bulletin EB50, this strength should be estimated as 110% of 28-day concrete strength.

The main characteristic of compressive strength is 28-day specified compressive strength. Each value of specified compressive strength corresponds to a certain mean value of compressive strength. According to the American building code ACI 318, the required average strength of concrete (mean value of this strength) is equal to fc'+1.34S (fc), where fc' is specified compressive concrete strength of concrete, S (fc) is the mean deviation of this strength. Thus, the value of modulus of rupture estimated according to the PCA Engineering Bulletin EB109 can be considered just corresponding to the value of 28-day specified compressive strength of this concrete.

Design strength of concrete pavement is estimated as a part of the modulus of rupture defined as a stress ratio factor. Strength safety of concrete pavement is equivalent to the safety of design flexural strength as a probability P(fr des < fr), flexural strength fr being considered as a random value. Strength safety of highway concrete pavements designed according to the Portland Cement Association Engineering Bulletin

EB109 corresponds to strength safety of reinforced concrete columns of multi-story building frames designed according to American Building Code ACI 318. More complete utilization of flexural strength of concrete means the thickness design of concrete with the use of values of modulus of rupture exceeding mean value of flexural strength and corresponding increase of design strength of concrete.

However, design flexural strength of concrete is always less than the mean value of flexural strength of concrete. According to the invention, airport concrete pavements are designed with preset strength safety levels corresponding to the values of strength safety indexes β equal to 3 and 2.5 for critical and non-critical areas of airport, respectively. Strength safety of concrete pavement is equivalent to safety at design flexural strength. Degree of utilization of flexural strength can be considered as a ratio between design and mean values at this strength.

As applied to airport pavements of critical and non-critical areas, estimations of degree of utilization of flexural strength constitute 0.55 and 0.625, respectively, the coefficient of variation of flexural strength being assumed equal to 15%. For comparison, strength safety of highway concrete pavement designed according to Portland Cement Association Engineering Bulletin EB109P corresponds to strength safety index β exceeding 4, and degree of utilization of flexural strength of this pavement is less than 0.4

Possibility of increase of estimation of modulus of rupture of concrete of pavement of the certain stress ratio factor depends on the estimation of strength safety

of pavement corresponding to this value of modulus of rupture. It should be not less than the preset strength safety level required according to the invention. The preset strength safety levels of pavement of critical and non-critical zones of airport were chosen on the basis of analysis of the existing strength safety level of real structural members, since the practice is the only criterion of strength safety. The few considerable samplings of test results of underreinforced prestressed floor and roof slabs of multi-story building frames, mainly prestressed hollow-core slabs (more than 2,000 slabs), were used for the estimation of existing strength safety level of real structures. These slabs were designed according to the Russian building code, produced and tested at the Russian plants of precast concrete. Russian construction is based on the use of precast concrete, and the Russian building code requires regular tests of these structural members, mainly floor and roof slabs.

Furthermore, the estimation of strength safety of these slabs was compared with the estimation of strength safety of columns, which is based on the test results of 111 axially loaded reinforced concrete columns of multi-story building frames produced at the Moscow plants. To apply this data to the American building practice, it is necessary to compare the strength design of the same underreinforced flexural members, according to the American building code ACI 318 and the Russian building code.

The sufficiency of thickness of pavement corresponding to increased value of modulus of rupture should be checked according to the thickness design procedure. As a result of more complete utilization of flexural strength of concrete, thickness of

concrete pavement of highways and streets can be reduced by 8-10% as compared with that provided by current design procedure. In so doing, pavement of reduced thickness corresponds to requirements of fatigue and erosion analysis of this design procedure, and strength safety of this pavement can be considered sufficient.

The High-Performance CONstruction MATerials and Systems (CONMAT) program is a ten-year, $2 billion national program of technological research, development, and deployment. One of its main goals is to make the best use of existing national resources. More complete utilization of flexural strength of concrete, as applied to thickness design of concrete pavements of airports, is in format of this program.

Thus, this invention relates to more complete utilization of flexural strength of pure normal concrete of airports concrete pavement.

Production of concrete in the U.S.A. constitutes hundreds millions of cubic meters per year, and part of this concrete is used in the airport pavement construction. Flexural strength is the main characteristic of strength of this concrete, and more complete utilization of flexural strength of this material is important in terms of reduction of cost of airport construction in the country.

Office Action Summary

1. What is the specific composition of concrete which gives these properties? (p.7 of Office Action Summary) This invention relates to more complete utilization of flexural strength of normal concrete, and it is based on the results of processing data of American test results of more than 4,000 series of compression and flexural normal

concrete samples of different compositions. These samplings can be considered as generally related to normal concrete as a whole, and its statistical characteristics of compressive and flexural strength also relate to normal concrete as a whole.

2. What is exactly is the claimed invention?

A process of design of concrete pavement for airports of the preset strength safety level with thickness less by 8-10 % than the thickness of this pavement provided by the current Portland Cement Association design procedure due to more complete utilization of flexural strength of concrete than that provided by current Portland Cement Association design practice of utilization of this strength, mix design of concrete of pavement being determined by the value of 90-day modulus of rupture (MR) required according to said Portland Cement Association design procedure and equal to the mean value of 28-day flexural strength increased by 10%.

Rejection Under 35 U.S.C. 102 and 35 U.S.C. (a)

Claims 1-5 were rejected under 35 U.S.C. (a and b) as anticipated by or, in the alternative, under 35 U.S.C. 103a as obvious over Kameta et al. '038 B1; Clavaud et al. '234; Masuda et al. '704; Lees et al. (RE 30,047 or U.S. Patent 4,105,458); Sawyer '674; Chase '590; Lang '956; Foulger '276; or Freyssinet '846. As indicated above, claims 1-5 have been cancelled and replaced by new claims 6-13.

Kameta Concrete composition for overlay method and hardened product therefrom.

This patent can not be related to a process providing more complete utilization of normal concrete of concrete pavements.

Clavaud U.S. Patent 6,080,234 Composite concrete

An ultra-high performance composite concrete, with low cement and fiber content and having good mechanical properties as well as good impacts, shocks and projectile protection properties, includes hydraulic binder, aggregates, an admixture of metal fibers. This patent is not related to a process providing more complete utilization of flexural strength of pure concrete of normal concrete pavements.

Lees et al. U. S. Patent 4,105,458 Road surfaces

As can be seen even from the title of this invention, it is not related to a process providing more complete utilization of concrete of normal concrete pavements. It involves a mix of aggregate materials in a binder and not normal concrete.

Sawyer U.S. Patent 4,160,674 Early high-strength Portland cement and method of manufacture. Not related to applicant's process. As can be seen even from the title of this invention, it cannot be related to a process providing more complete utilization of concrete of normal concrete pavements. It involves a special mix of concrete, not ordinary concrete.

Chase U.S. Patent 4,888,590 Aircraft runway

This patent involves a special configuration of runway and is not related to a process for producing a method of providing more complete utilization of normal concrete of concrete pavements.

The Foulger U.S. Patent 3,000,276 involves a design of a concrete slab with special emphasis on the use of special plastic sheets between the concrete slabs and the base, the purpose of which is to reduce the coefficient of friction between the concrete slab and the base. This is clearly unrelated to applicant's concept.

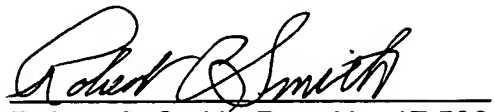
The Lang U.S. Patent 4,653,956 involves highway pavement, which is prestressed and mounted on a low restraint or low friction layer to reduce the coefficient of friction. This patent has no relationship to a process for designing normal concrete to provide saving of concrete by utilizing more efficiently the flexural strength of the concrete.

The Masuda U.S. Patent 5,558,704 deals with asphalt pavement and not concrete pavement. It is clearly unrelated to applicant's invention.

The Examiner mentioned the patent to Freyssinet '846, but the patent number did not appear on the form PTO-892. It is believed that the Examiner intended to cite U.S. Patent 2,655,846. This patent describes large concrete slabs for airports with reinforcing rods. Applicant's invention is not related to reinforced concrete.

It is believed that applicant's new claims clearly define over the cited art and are in condition for allowance. Favorable action is requested.

Respectfully submitted,



Robert C. Smith, Reg. No. 17,500
LAW OFFICES OF JOHN E. WAGNER
3541 Ocean View Boulevard
Glendale, CA 91208
(818) 957-3340

RCS:mm

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